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WO 2001/013721 (01.03.2001 Gazette 2001/09)(54) **WATER-DISPERSIBLE AGROCHEMICAL COMPOSITIONS**

WASSER-DISPERGIERBARE AGROCHEMISCHE ZUSAMMENSETZUNGEN

COMPOSITIONS AGROCHIMIQUES HYDRODISPERSABLES

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EP-A- 0 302 983 EP-A- 0 766 918
WO-A-91/13546 WO-A-95/08265
DE-A- 3 633 363

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Description

[0001] The invention relates to novel chemical compositions in particular, compositions of biologically active agents and their use. The invention is more particularly concerned with granular compositions of low dose-rate agrochemicals, for example pesticides, suitably prepared by an extrusion process, which deliver the active ingredient of the composition efficiently to the substrate, for example a crop, which is to be treated.

[0002] The advantages of dispersible granule formulations of pesticides are known and include their ease of handling and reduced worker exposure compared to powder or liquid formulations. G. A. Bell, "Chemistry and Technology of Agrochemical Formulations", Edited by D. A. Knowles (Kluwer, 1998), pages 80-114, describes a range of dispersible granule types and processes for their manufacture.

[0003] Dispersible granules may be prepared by extrusion. US 3,954,439 discloses granular compositions of a herbicidal agent and one or more surfactants and processes for the production of such compositions. The process described in US 3,954,439 is applicable to those herbicides which are substantially insoluble in water. This patent states that it is obviously desirable that the granules should have the highest possible content of active herbicidal material. This patent further states that the process is preferably carried out so as to give granules containing at least 50% of active herbicide material and that it is more preferable that the granules should contain more than this, that is at least 80% and even up to 95%. The patent also teaches that it is obviously important to keep the surfactant content down to a minimum, the total amount of surfactant preferably being from 5 to 15%.

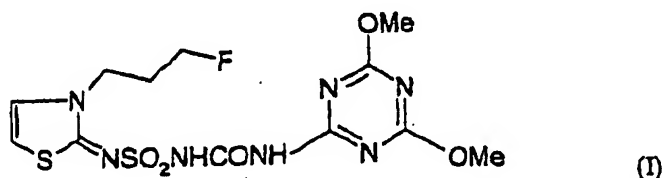
[0004] US 5,872,078 relates to dry, water soluble and/or water dispersible, agriculturally acceptable herbicidal compositions containing N-phosphonomethylglycerine or acceptable water-soluble salt thereof. The composition may comprise further optional ingredients, one of which may be a co-herbicide. A large number of co-herbicides are listed including sulfonylureas such as those available under the trade names Ally, Classic, Oust, Glean and mixtures thereof. A liquid surfactant is added to this mixture and extrusion granulation may be used to process the compositions described to form granules.

[0005] WO 95/08265 describes a water dispersible granular composition made by heat extrusion. The compositions comprise up to 80% of an active, optionally a base, urea and a urea modifier. The compositions are formed by the mixture of ingredients melting as work is applied by the friction of the extrusion process or heating and by extruding a dry premix of the ingredients and then cutting, breaking or sieving the extruded strands to form the composition.

[0006] DE 3633363 describes a composition comprising propanil and bensulfuron-methyl. The level of active ingredient is said to be between 0.5 to 90%, the compositions being produced in a known manner, for example by mixing. In the examples of DE3633363, reference is made to Londax 10WP; a trade name for bensulfuron-methyl.

[0007] WO91/13546 relates to compositions of agglomerates consisting essentially of solid pesticidal particles bound together by soluble bridges of a heat activated binder. The binder is said to act as a bridge between the components which are physically separated due to incompatibility.

[0008] EP 768918 relates to compositions comprising a specific active ingredient, a fluoropropylthiazoline derivative of formula I:



in combination with at least one compound selected from phenmedipham, ethofumesate, chloridazon, metamitron and triflurosulfuron-methyl.

[0009] EP302983 describes a composition having three active components, Chlortoluron, Terbutryn and Triasulfuron in a ratio of 100 to 30:20 to 60:1.

[0010] Improved delivery and bioavailability of the active ingredient in agrochemical compositions, especially of water insoluble actives for example sulphonyl ureas, to achieve a desired agrochemical effect is desirable. It is also desirable to achieve this effect in as cost effective manner as possible and conventionally this has been achieved by including as high a level of active ingredient as possible in a formulated composition.

[0011] We have now surprisingly found that a composition containing a lower level of a primary active ingredient than conventionally employed in compositions containing the same ingredient, together with a suitable dispersing agent may confer enhanced delivery of the primary active ingredient to the crop to be treated. The invention is particularly

applicable to a low use rate agrochemical for instance a pesticide, and especially a water-insoluble agrochemical. Furthermore, as this enhanced effect may be achieved at a lower level of active ingredient in the composition, the composition may include additional materials in the remaining "formulation space" to provide additional effects.

[0012] Accordingly, a first aspect of the invention provides a water dispersible granular agrochemical composition comprising a primary agrochemical active ingredient, preferably a low use rate active ingredient, at a level of less than 50% by weight of the composition and a dispersing agent, preferably a nonionic and/or anionic surfactant(s) the composition being obtainable by a process comprising preparing a wetted mix in the form of a free-flowing powder comprising the primary active ingredient and the dispersing agent and optionally other components wherein at least one of the dispersing agent and optional other component is liquid and extruding the mix to form granules.

[0013] The compositions according to the first aspect of the invention provide surprisingly beneficial bioavailability of the active for instance by making a larger proportion of the active biologically available in a liquid carrier, for example water, with which the composition is mixed in use than a known composition having a high level of active. The compositions disperse rapidly in the liquid carrier to form stable suspensions of the active material(s) and subsequently dissolve at a rate and to an extent higher than that achieved by conventional compositions containing the same ingredients. This property provides enhanced efficacy of the agrochemicals with attendant reduced crop damage. This enhanced bioavailability means that a given agrochemical effect may be obtained using a lower total amount of agrochemical active thus providing environmental benefits through lower use of agrochemicals.

[0014] Further, as the concentration of the active is lower than conventionally employed, there is a reduced risk that some of the active will not be dispersed or dissolve in the liquid carrier. Hence the risk of poor dispersion or dissolution of the active in a liquid carrier leading to high localised concentrations of the active penetrating to the crop especially the roots of plants and possibly damaging the crop is reduced.

[0015] A further advantage is that the lower level of primary active ingredient provides enhanced flexibility in formulating a composition as compared to conventional compositions employing high levels of active. Thus, the formulator may include a secondary active ingredient or other materials as desired in the composition to provide an optimum effect or balance of properties.

[0016] It has also been surprisingly found that when low use-rate pesticides, such as water-insoluble compounds including sulfonyl ureas, for example as described in US 5,872,078, are employed as the primary active ingredient with a secondary high rate use pesticide and a suitable dispersing agent at the required level, the rate and extent of solubility and thus the bioavailability, of the primary active or both the actives may be increased as compared to granules containing the equivalent amount of each material alone. Optimally, the primary and secondary actives are intimately mixed in suitable proportions. Suitably, optional conventional other ingredients such as one or more additional surfactants are included in the formulation and the ingredients are processed into a suitable form, for example water-dispersible granules.

[0017] Accordingly the invention also provides in a preferred embodiment an agrochemical composition comprising as a primary active ingredient, a low use rate agrochemical active ingredient, at a level of less than 50% by weight of the composition and a secondary active ingredient, preferably a high use rate active ingredient, and a dispersing agent, preferably an anionic and/or nonionic surfactant.

[0018] In addition to the advantages referred to above for composition according to the invention, the compositions provide at least an enhanced effect as regards the primary active and suitably an effect greater than the combined additive effect of both the primary and secondary active is observed where the composition contains a primary and secondary active.

[0019] The term "low use rate" active denotes those agrochemical actives which typically are applied at a rate of less than 100g/hectare and the term "high use rate" active denotes those agrochemical actives which typically are applied at a rate of more than 1000g/hectare.

[0020] The compositions of the present invention result in the individual components being used at lower rates and with less phytotoxicity than conventional compositions of the said active materials, against a wide range of pests and diseases.

[0021] The level of primary active ingredient is suitably selected according to the particular compound to be used but is preferably less than 30% by weight of the composition, especially in the case of a low use rate active. For example, chlorsulfuron may suitably be employed at a level of less than 30%, for example 25% by weight of the composition. In a preferred embodiment, the primary active ingredient, for example bensulfuron, is present at a level of less than 10% and more preferably less than 2% by weight of the composition. In an especially preferred embodiment the primary active is present at a level of less than 1%. Suitably, the composition will contain the primary active at a level at which, on mixing with a liquid carrier, it provides a concentration of active which will provide a beneficial effect in treating crops. This level may suitably be at 0.05% but is preferably at least 0.1% and desirably at least 0.2% by weight of the composition although the precise level may be adjusted according to the particular application and the particular primary active present in the composition.

[0022] Where a second active is employed, it is suitably present at a level greater than the level of the primary active

ingredient. In a preferred embodiment the secondary active is present at a level of at least 30%, more preferably at least 50%, optimally at least 65%, for example 75% by weight of the composition

[0023] The invention comprises a dry, free-flowing, dustless and rapidly dispersing granular formulation containing a low use rate pesticide or mixture of pesticides together with an additional high use rate pesticide. The terms composition and formulation are used herein to have the same meaning.

[0024] A suitable dispersing agent(s) is/are incorporated into the formulation at a specific ratio so as to enable the rapid dispersion and subsequent dissolution of the low use rate and high use rate active material upon dilution and subsequent application. Suitably, the weight ratio of dispersing agent to the low use rate primary active ingredient in the composition is 0.1 to 10:1, preferably 0.4 to 6:1, for example about 4:1 and about 5:1.

[0025] The invention is particularly suitable for, but not limited to, such low use-rate pesticides as: Abamectin, imidazolinone, azoxystrobin, bensulfuron-methyl, carfentrazone-ethyl, chlorsulfuron, cinosulfuron, clodinafop, clopyralid, lambda-cyhalothrin, deltamethrin, diflufenican, emamectin benzoate, fibronil, flurtamone, imazamethabenz-methyl, imazapyr, imazethapyr, imadacloprid, metsulfuron-methyl, milbectin, nicosulfuron, pirimisulfuron-methyl, rimsulfuron, sulfometuron-methyl, thifensulfuron-methyl, tribenuron-methyl, and tirflusulfuron-methyl. Preferably the low use rate pesticide is a sulfonyl urea.

[0026] Suitable high use rate pesticides include: Abamectin, atrazine, benomylbentazone, bifenox, bromoxynil, captan, carbendazim, chloridazon, chlorothalonil, chlortoluron, lambda-cyhalothrin, cyhexatin, cymoxynil, alpha-cypermethrin, deltamethrin, dimethomorph, diuron, ethofumesate, fibronil, flurtamone, glyphosate, imazamethabenz-methyl, imazapyr, imazethapyr, imadacloprid, isoproturon, linuron, mancozeb, maneb, metamitron, methiocarb, metribuzin, milbectin, oxadixyl, oxyfluorfen, phenmedipham, propanil, propyzamide, simazine, thifensulfuron-methyl and thiram.

[0027] In an especially preferred embodiment, the low use rate pesticide comprises bensulfuron-methyl and the high use rate pesticide comprises propanil.

[0028] In a preferred embodiment, the dispersing agent comprises a surfactant with nonionic surfactants and especially anionic surfactants being preferred. Examples of suitable dispersing agents include alkali metal, preferably sodium salts of lignosulphonates, naphthalene sulphonate formaldehyde condensates, tristyrylphenol ethoxylate phosphate esters, aliphatic alcohol ethoxylates, alkylphenol ethoxylates, ethylene oxide/propylene oxide (EO-PO) block copolymers, "comb" graft copolymers and polyvinyl alcohol-vinyl acetate copolymers. Other dispersing agents known in the art may be employed as desired.

[0029] In addition to the dispersing agent, other components may be present in the composition for example a wetting agent. Suitable wetting agents include: alkali metal salts of alkylaryl sulphonates, alkyl aryl sulposuccinates and alkyl sulphates, preferably as the sodium salt. Other wetting agents, and other excipients known to those skilled in the art may be employed as desired including disintegrants for example: Bentonite, modified starch and polyvinyl pyrrolidone; stabilisers, for example citric acid, polyethylene glycol and butylated hydroxy toluene; and fillers, for example, starch, lactose, china clay, sucrose and kaolin; and flow-aids.

[0030] The granular compositions are preferably prepared by the method described in PCT application WO 00/42846 the contents of which are hereby incorporated by reference. Suitably the process comprises, preparing a mix in the form of a free-flowing powder, preferably a homogeneous powder, comprising the primary active ingredient and a dispersing agent and optionally other components, preferably without forming a paste, and extruding the pre-mix in an extruder, for example a low pressure extruder to form the granules. A pre-mix optionally containing the secondary active ingredient may be mixed with the dispersing agent and the primary active ingredient to form the mix for extrusion. The dispersing agent may be liquid in which case an additional liquid component is not required although a further liquid component may be included as desired.

[0031] Suitable apparatus for the blending step(s) include a low-shear, high intensity blender such as a Lodige Ploughshare mixer, ribbon, Y-cone, double cone or trough blender, so that a free-flowing powder is formed. The mix is fed directly or indirectly into a suitable low-pressure extruder, such as that described in WO 96/26828, so that the premix is compacted against the apertures in the screen and forced through.

[0032] In a preferred embodiment, the composition of the mix and the extruder settings are such that the formation of a paste before extrusion is avoided and the material being processed remains a free flowing particulate material during the formation of the pre-mix. In particular, the material optimally does not form a paste prior to extrusion. However, as the composition may contain one or more liquid components, it may be wet or dry provided that it remains free-flowing and particulate during the process. In this context, a paste may be considered as a mass of material, for example an agglomerate, which contains sufficient liquid or is at such a temperature that the particulate material being processed forms into an agglomerate which is mouldable or deformable and which is not free-flowing. Thus, a paste does not disintegrate into finer particles on application of shear, for example by rubbing between fingers, but rather remains as an agglomerated mass and the shear acts to mould or deform the agglomerate.

[0033] If desired, the components of the composition, either in sequence, all together or some in sequence and others together are first mixed, for example in a blender so that a uniform blend is obtained which is then passed through a suitable milling system such as an air mill, pin mill or air-swept impact mill so that a fine powder (the pre-

mix) comprising an average particle size of 0.5 to 20 microns, or more preferably between 0.5 to 5 microns is obtained. The powder thus obtained is suitably agglomerated, so that uniform, dust-free granules are obtained, preferably by the process described in WO 00/42846. This preferred method involves the extrusion of the wetted powder which is then in the form of a freely flowing homogeneous powder, in a low temperature, low pressure extruder, for example as described in EP-A-812256.

[0034] Where present, the low use rate and high use rate agrochemicals may be combined in the formation of the dry pre-mix with the other formulation ingredients for example dispersing agents or alternatively the pre-mix may be prepared with one of the agrochemicals and the other added to the milled pre-mix. This alternative approach is preferred when the high use rate pesticide is propanil which is suitably incorporated in the dry pre-mix, and the low use rate pesticide is then added to the pre-mix and blended with it prior to granulation.

[0035] In a second aspect, the invention provides a method of treating a plant by applying a herbicidally effective amount of a composition according to the present invention to the plant or to the locus of the plant.

[0036] The present invention enables the composition of the invention to be used at a lower rate of use (mass of composition / unit area, typically grammes per hectare) to achieve a given effect than known compositions. Suitably the agrochemical active is applied to the plant or locus of the plant at a rate of use of less than 75%, more preferably less than 50% of the conventional rate of use for the active in commercially available compositions.

[0037] In a preferred embodiment, a composition comprising a sulphonyl urea low use rate active for example bensulfuron, is applied in use at a rate of use of less than 50 g/hectare, especially less than 30g/hectare and optimally less than 20 g/hectare. Typically, a commercially available composition containing in excess of 50% by weight of the composition of bensulfuron-methyl may be employed at a rate of use of 60g/hectare or more. In another preferred embodiment, the composition comprises a high use rate secondary active comprising propanil in addition to a sulphonyl urea active, for example bensulfuron, and suitably the secondary active is applied in use at a rate of less than 7000g/hectare, preferably less than 5000g/hectare and especially at a rate of less than 3200g/hectare.

[0038] Where the plant is a weed, suitably, the treatment is such as to control or kill the weed. Generally, the composition is applied to the plant or its locus by means of a liquid carrier, typically water, with which the composition is mixed prior to application. If desired, the composition may be mixed with a liquid carrier to form a concentrate suitable for subsequent mixing with a liquid carrier. The application of the composition to the plant or its locus in solid or concentrate form especially where water is present in the vicinity of the plant through natural precipitation is also within the ambit of the invention.

[0039] In water, suitably the composition is diluted for use to a level of 10 to 500 mg/l and preferably 20 to 300mg/l. The dilution is suitably selected according to the composition used, the type of application, the state of growth of the plants to be treated and other factors known to those skilled in the art.

[0040] In a third aspect, the invention provides for use of a composition according to the invention as an agrochemical, for example a low use rate herbicide.

[0041] This invention relates to novel compositions and to methods of treating plants, for example killing or controlling weeds by applying a reduced amount of the active ingredient(s), suitably diluted in water, than that normally recommended for such active(s) against such weeds. In addition the invention allows for the avoidance of subsequent applications of the said actives, thus further reducing the amount of pesticide used.

[0042] The following examples illustrate the invention in a non-limiting manner.

Example 1

[0043]

Chlorsulfuron 25 WG		
Ingredient	Trade name	% w/w
Chlorsulfuron technical (95%)	(technical a.i.)	26.32
Sodium lignosulfonate	Ultrazine NA	12.50
Dodedyl benzene sulphonate, Sodium salt	Arylan SX85	5.00
Lactose	Lactose	56.18

Method

[0044] The chlorsulfuron technical was airmilled using a Gem-T airmill before combining with other components. The technical, Ultrazine and Arylan components were blended until uniform in a high speed blender. The lactose was then

added and the formulation blended for a further 15 seconds. 12% distilled water was added whilst blending. The wetted premix (free flowing powder) was fed to a basket extruder as described in EP-A-812256 through a 1mm screen. A compacted extrudate was obtained and the resulting granules dried at 60C for 8 minutes. The dried granules were then sieved through 2 mm and 500 micron sieves.

Comparative Example A

[0045]

Chlorsulfuron 75 WG		
Ingredient	Trade name	% w/w
Chlorsulfuron technical (95%) technical a.i.)		78.95
Sodium lignosulfonate	Ultrazine NA	12.50
Diisopropyl naphthalene sulfonate, sodium salt	Galoryl MT704	1.00
Lactose	Lactose	7.55

Method

[0046] The chlorsulfuron technical was airmilled using a Gem-T airmill before combining with other components. The milled chlorsulfuron technical, Ultrazine and Galoryl components were blended until uniform in a high speed blender. The lactose was then added and the formulation blended for a further 15 seconds. 17% distilled water was added whilst blending. The wetted premix (free flowing powder) was fed to a basket extruder as described in EP-A-812256 through a 1mm screen. A compacted extrudate was obtained and the resulting granules dried at 60C for 8 minutes. The dried granules were then sieved through 2 mm and 500 micron sieves.

[0047] The solubility of the compositions produced according to Example 1 and Comparative Example A and Glean (commercially available 75 WG product) and airmilled technical was tested using the method below:

Solubility test method

[0048] 200 mls water was poured into a jacketed glass vessel and allowed to reach 25C. A Grant recirculator was used to maintain the temperature at 25C +/- 1C. A magnetic stirrer at a set speed was used to stir the water. The specified weight of granules was then added to the water and allowed to disperse for 30 seconds before a timer was started. A 2 mls sample was removed using a syringe after 5 minutes and filtered using a 0.45 micron syringe filter. The solution was then analysed to determine the active concentration using a HPLC method. The theoretical concentration assuming 100% solubility was calculated using an assay obtained using the HPLC.

[0049] The following data was obtained:

Formulation	Product	Dilution rate (mgs a.i. /L)	Type of water used to dilute granules	% active added to water that dissolved after 5 minutes
Example 1	25 WG	69	Distilled	98
Comparative Example A	75 WG	72	Distilled	95
Glean (Du Pont)	75 WG	72	Distilled	67
Airmilled technical	-	91	Distilled	<2

Conclusions

[0050] Both the 75 and 25 extruded WG formulations have a significantly higher solubility in distilled water compared to the commercial product. The technical is not readily soluble in distilled water at this temperature.

Example 2**[0051]**

<u>Bensulfuron-methyl 1 WG</u>		
Ingredient	Trade name	% w/w
Bensulfuron methyl technical (95%)	(technical a.i.)	1.05
Naphthalene sulfonic acid	Galoryl DT505	12.70
Formaldehyde condensate, sodium salt		
Di isopropyl naphthalene sulfonate, sodium salt	Galoryl MT704	1.00
Lactose	Lactose	85.25

Method

[0052] The technical and Galoryl DT505 were blended together until uniform. The blend was then airmilled using a Gem-T airmill. The milled premix, Galoryl MT704 and lactose were blended until uniform in a high speed blender. The lactose was then added and the formulation blended for a further 15 seconds. 12% distilled water was added whilst blending. The wetted premix (free flowing powder) was fed to a basket extruder as described in EP-A-812256 through a 1mm screen. A compacted extrudate was obtained and the resulting granules dried at 60C for 8 minutes. The dried granules were then sieved through 2mm and 500 micron sieves.

Comparative Example B**[0053]**

<u>Bensulfuron-methyl 60 WG</u>		
Ingredient	Trade name	% w/w
Bensulfuron methyl technical (95%)	(technical a.i.)	64.21
Naphthalene sulfonic acid	Galoryl DT505	12.70
Formaldehyde condensate, sodium salt		
Di isopropyl naphthalene sulfonate, sodium salt	Galoryl MT704	1.00
Lactose	Lactose	22.08

[0054] The composition of Comparative Example B was prepared using the method set out in Example 2.

[0055] The solubility of the compositions of Example 2 and Comparative Example B were then tested using the method detailed in Example 1. The following data was obtained:

Formulation	Product	Dilution rate (mgs a.i. /L)	Type of water used to dilute granules	% active added to water that dissolved after 5 minutes
Londax	60 WG	300	Tap	12
Comparative Example B	60 WG	291	Tap	25
Londax	60 WG	75	Tap	19
Comparative Example B	60 WG	73	Tap	48
Example 2	1 WG	240	Tap	71

Example 3

Propanil and bensulfuron-methyl combined WG (75% propanil and 0.75% bensulfuron)

5 Propanil Premix

[0056] A premix of Propanil was prepared as follows:

Ingredient	Trade name	% w/w
Propanil technical (97.0% a.i.)	Technical	82.47
Starch	Paselli	1.00
Nonionic surfactant and sodium Lignosulphonate blend	Stepsperse DF 500	5.00
Modified sodium lignosulphonate	Ufoxane 3A	5.00
Hydrated aluminium silicate	China Clay	to 1.00

[0057] The ingredients were blended in a medium shear, high speed blender for 5 minutes until uniform. The resulting mixture was passed through an air mill to obtain a fine powder. The powder was wetted with 19.5% water (based on the dry weight of powder) and blended until a damp free flowing powder was formed. The premix was used in the following blends with bensulfuron:

Ingredient	Trade name	% w/w
Bensulfuron methyl technical (95%)	(technical a.i.)	0.79
Propanil 80% milled premix	-	93.75
Naphthalene sulfonic acid Formaldehyde condensate, sodium salt	Galoryl DT505	0.31
China clay	China clay GTY	5.15

[0058] The technical and Galoryl DT505 were blended together until uniform. The blend was then airmilled using a Gem-T airmill. The milled bensulfuron-methyl and milled propanil premixes, Galoryl MT704 and china clay were blended until uniform in a high speed blender. 17% distilled water was added whilst blending. The wetted premix (free flowing powder) was fed to a basket extruder as described in EP-A-812256 through a 1mm screen. A compacted extrudate was obtained and the resulting granules dried at 60C for 8 minutes. The dried granules were then sieved through 2mm and 500 micron sieves.

Example 4

Propanil and bensulfuron-methyl combined WG (75% propanil and 0.375% bensulfuron)

[0059]

Ingredient	Trade name	% w/w
Bensulfuron-methyl technical (95%)	(technical a.i.)	0.39
Propanil 80% milled premix	-	93.75
Naphthalene sulfonic acid Formaldehyde condensate, sodium salt	Galoryl DT505	0.16
China clay	China clay GTY	5.70

[0060] The technical and Galoryl DT505 were blended together until uniform. The blend was then airmilled using a Gem-T airmill. The milled bensulfuron-methyl and milled propanil premixes, Galoryl MT704 and china clay were blended until uniform in a high speed blender. 17% distilled water was added whilst blending. The wetted premix (free flowing powder) was fed to a basket extruder as described in EP-A-812256 through a 1mm screen. A compacted extrudate was obtained and the resulting granules dried at 60C for 8 minutes. The dried granules were then sieved through 2mm and 500 micron sieves.

[0061] The above combination formulations were tested using the solubility method detailed in Example 1. The following data was obtained:

Formulation	% bensulfuron-methyl a.i.	Dilution rate (mgs a.i. /L)	Type of water used to dilute granules	% active added to water that dissolved after 5 minutes
Example 3	0.75	75	Tap	66
	0.75	112.5	Tap	64
Example 4	0.375	37.5	Tap	83
	0.375	56	Tap	84

[0062] Further solubility testing up to 2 hours was carried out using the same method as for Example 1 except the granules were diluted in 1000 mls water and samples were taken after 5, 30, 60 90 and 120 minutes. The following results were obtained using 37.5 mgs a.i./litre (all in tap water). Data for Comparative Example B (bensulfuron-methyl 60 WG) and Londax (commercial bensulfuron-methyl 60 WG) at the same dilution rate is shown for comparison.

Time (mins)	% active added to water that dissolved		
	Example 5	Comparative Example B	Londax
5	67	42	15
30	67	52	32
60	67	57	39
90	66	57	49
120	69	62	53

Conclusions

[0063] The solubility rate of bensulfuron-methyl in a granule which also contains an active that is used a high rate per hectare, is significantly higher compared with diluting the bensulfuron-methyl as a 60 WG.

Example 5

Propanil and bensulfuron-methyl combined WG (75% propanil and 0.24% bensulfuron)

[0064]

Ingredient	Trade name	% w/w
Bensulfuron methyl technical (95%)	(technical a.i.)	0.25
Propanil 80% milled premix	-	93.72
Naphthalene sulfonic acid Formaldehyde condensate, sodium salt	Galoryl DT505	0.10
China clay	China clay GTY	5.90

[0065] The processing method set out in Example 4 was employed, with the bensulfuron-methyl being milled as a premix with the Galoryl DT505. The solubility of the bensulfuron-methyl in the above formulation was then tested using the method set out in Example 4. The following results were obtained using 25 mgs and 31.3 mgs bensulfuron-methyl a.i./litre (in tap water).

Time (mins)	% bensulfuron-methyl active added to water that dissolved	
	Example 5 (25 mgs/L)	Example 5 (31.3 mgs/L)
5	89	91
30	90	92
60	94	92
90	93	96
120	97	95

Field Evaluation

[0066] A composition according to Example 4 was evaluated in the field in comparison with commercial formulations containing the same active ingredients.

Treatment Details		
Number	Treatment Composition	Rate of use (g/Hectare) Product
Control	Untreated Control	-
1	Stam 80 EDF	4,000g at Growth Stage BBCH 12-13 8,000g at Growth Stage BBCH 21-21
2	Stam 80 EDF + Londax 60	4,000g at Growth Stage BBCH 12-13 100g at Growth Stage BBCH 12-13
3	Example 4	4,000g at Growth Stage BBCH 12-13

[0067] The above treatments were applied in 400 l water/ha on Rice *v.loto* against Gramineae family weeds. The weeds were assessed at -1, +4, +16 and +32 days after application by the efficacy assessment guidelines provided by EPPO Guidelines PP1/181(2), PP1/152(2) and 1/62(2). Stam 80 EDF is a commercial formulation containing 80% propanil in the form of an extruded granule. Londax 60 is a commercial formulation containing 60% bensulfuron-methyl in the form of a fluid bed granule.

Results

[0068]

Assessment : 1 day before 1 st Application										
Weeds	Control	Treatment 1			Treatment 2			Treatment 3		
	% cov.	% cov.	% eff.	Sympt.	% cov.	% eff.	Sympt.	% cov.	% eff.	Sympt.
<i>Heteranthera limosa</i>	38.0	37.0	0.0	n.a.	35.0	0.0	n.a.	35.0	0.0	n.a.
<i>Heteranthera reniformis</i>	0.0	1.0	0.0	n.a.	0.0	0.0	n.a.	0.0	0.0	n.a.
<i>Echinochloa crus-galli</i>	1.0	1.0	0.0	n.a.	1.0	0.0	n.a.	1.0	0.0	n.a.
<i>Panicum dichotomiflorum</i>	1.0	1.0	0.0	n.a.	1.0	0.0	n.a.	1.0	0.0	n.a.
<i>Scirpus maritimus</i>	1.0	1.0	0.0	n.a.	1.0	0.0	n.a.	2.0	0.0	n.a.

(continued)

Assessment : 1 day before 1 st Application										
Weeds	Control	Treatment 1			Treatment 2			Treatment 3		
	% cov.	% cov.	% eff.	Sympt.	% cov.	% eff.	Sympt.	% cov.	% eff.	Sympt.
<i>Scirpus mucronatus</i>	1.0	1.0	0.0	n.a.	2.0	0.0	n.a.	1.0	0.0	n.a.

Assessment: 4 days after 1 st Application										
Weeds	Control	Treatment 1.			Treatment 2			Treatment 3		
	% cov.	% cov.	% eff.	Sympt.	% cov.	% eff.	Sympt.	% cov.	% eff.	Sympt.
<i>Heteranthera limosa</i>	55.0	55.0	70.0	WC	34.0	80.0	W	40.0	50.0	W
<i>Heteranthera reniformis</i>	0.5	0.0	0.0	n.a.	0.6	0.0	n.a.	0.0	0.0	n.a.
<i>Echinochloa crus-galli</i>	7.0	0.0	0.0	n.a.	1.0	0.0	n.a.	1.0	0.0	n.a.
<i>Panicum dichotomiflorum</i>	5.5	0.0	0.0	n.a.	1.0	0.0	n.a.	1.0	0.0	n.a.
<i>Scirpus maritimus</i>	1.0	4.0	90.0	W	0.0	0.0	n.a.	3.0	70.0	W
<i>Scirpus mucronatus</i>	2.0	1.0	60.0	W	2.0	60.0	W	5.0	70.0	W

Assessment : 16 days after 1 st Application										
Weeds	Control	Treatment 1			Treatment 2			Treatment 3		
	% cov.	% cov.	% eff.	Sympt.	% cov.	% eff.	Sympt.	% cov.	% eff.	Sympt.
<i>Heteranthera limosa</i>	55.0	1.0	99.0	W.C.	18.0	80.0	W.C.	2.0	98.0	W
<i>Heteranthera reniformis</i>	0.0	0.0	0.0	n.a.	0.0	0.0	n.a.	0.0	0.0	n.a.
<i>Echinochloa crus-galli</i>	10.0	0.0	0.0	n.a.	1.0	0.0	n.a.	0.0	0.0	n.a.
<i>Panicum dichotomiflorum</i>	15.0	0.0	0.0	n.a.	1.0	0.0	n.a.	0.0	0.0	n.a.
<i>Scirpus maritimus</i>	5.0	0.0	0.0	n.a.	0.0	0.0	n.a.	1.0	98.0	W
<i>Scirpus mucronatus</i>	15.0	0.0	0.0	n.a.	0.0	0.0	n.a.	0.0	0.0	n.a.

Assessment : 32 days after 1 st Application												
Weeds	Control	Treatment 1			Treatment 2			Treatment 3				
		% cov.	% eff.	Sympt.	% cov.	% eff.	Sympt.	% cov.	% eff.	Sympt.		
<i>Heteranthus</i>	37.0	0.0	0.0	n.a.	1.0	0.0	n.a.	0.0	0.0	n.a.		
<i>Heteranthus</i>	1.0	0.0	0.0	n.a.	0.0	0.0	n.a.	0.0	0.0	n.a.		
<i>Echinochloa crus- galli</i>	10.0	0.0	0.0	n.a.	0.0	0.0	n.a.	0.0	0.0	n.a.		
<i>dichanthium</i>	15.0	0.0	0.0	n.a.	2.0	0.0	n.a.	0.0	0.0	n.a.		
<i>Scirpus</i>	5.0	0.0	0.0	n.a.	0.0	0.0	n.a.	0.0	0.0	n.a.		
<i>Syntherisma</i>	32.0	0.0	0.0	n.a.	0.0	0.0	n.a.	0.0	0.0	n.a.		

Abbreviations :

[0069]

- 5 % cov. : % area covered by weeds
 % eff. : % herbicide efficacy (% of weeds showing necrotic symptoms):
 Sympt. : symptoms (W: withered; C:chlorotic; n.a. not applicable)

Conclusions

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[0070] The above results demonstrate the composition of Example 4 (15g/ha bensulfuron-methyl combined with 3,000 g/ha propanil) provides equivalent control to the commercial products tested when applied at less than 1/3rd of the propanil in the Stam 80 EDF treatment (two applications, one 3200 a.i. g/ha and one 6400 a.i. g/ha propanil) and ¼ of the Londax rate (one application of 60g/ha bensulfuron-methyl tank mixed with one application of 3,200 g/ha propanil).

Claims

- 20 1. A water dispersible granular agrochemical composition comprising a primary agrochemical active ingredient at a level of less than 50% by weight of the composition and a dispersing agent the composition being obtainable by a process comprising preparing a wetted mix in the form of a free-flowing powder comprising the primary active ingredient and the dispersing agent and optionally other components wherein at least one of the dispersing agent and optional other component is liquid and extruding the mix to form granules.
- 25 2. A composition according to claim 1 in which the primary active is a low use rate active ingredient.
3. A composition according to claim 1 or claim 2 wherein the primary agrochemical active comprises a sulfonyl urea.
- 30 4. A composition according to any one of the preceding claims wherein the liquid component in the wetted premix comprises water.
5. A composition according to any one of the preceding claims wherein the extrudate is dried to form granules.
- 35 6. A composition according to any one of the preceding claims in which the active ingredient is selected from bensulfuron-methyl, chlorsulfuron, clinosulfuron, metsulfuron-methyl, nicosulfuron, pirimsulfuron-methyl, rimsulfuron, sulfometuron-methyl, thifensulfuron-methyl, and triflusaluron-methyl.
- 40 7. A composition according to any one of the preceding claims in which the primary active ingredient is present at a level of less than 30% by weight of the composition.
8. A composition according to any one of the preceding claims in which the active ingredient comprises bensulfuron-methyl and/or chlorsulfuron.
- 45 9. A composition according to claim 8 comprising bensulfuron-methyl at a level of less than 10% by weight of the composition.
10. A composition according to any one of the preceding claims further comprising a high use rate secondary active ingredient.
- 50 11. A composition according to claim 10 in which the secondary active ingredient is present at a level greater than the level of the primary active ingredient.
12. A composition according to any one of claims 10 or 11 in which the secondary active is present at a level of at least 30%.
- 55 13. A composition according to any one of claims 10 to 12 in which the high use rate secondary active ingredient is selected from abamectin, atrazine, benomylbentazone, bifenox, bromoxynil, captan, carbendazim, chloridazon,

chlorothalonil, chlortoluron, lambda-cyhalothrin, cyhexatin, cymoxynil, alpha-cypermethrin, deltamethrin, dinethomorph, diuron, ethofumesate, fibronil, flurtamone, glyphosate, imazamethabenz-methyl, imazapyr, imazethapyr, imadacloprid, isoproturon, linuron, mancozeb, maneb, metamitron, methiocarb, metribuzin, milbectin, oxadixyl, oxyfluorfen, phenmedipham, propanil, propyzamide, simazine, thifensulfuron-methyl and thiram.

14. A composition according to claim 13 in which the secondary active ingredient comprises propanil.
15. A composition according to claim 14 in which the propanil is present at a level of at least 50% by weight of the composition.
16. A composition according to any one of the preceding claims in which the dispersing agent comprises an anionic and/or nonionic surfactant.
17. A composition according to claim 16 in which the dispersing agent is selected from alkali metal salts of lignosulphonates, naphthalene sulphonate formaldehyde condensates, tristyrylphenol ethoxylate phosphate esters, aliphatic alcohol ethoxylates, alkylphenol ethoxylates, ethylene oxide/propylene oxide (EO-PO) block copolymers, "comb" graft copolymers and polyvinyl alcohol-vinyl acetate copolymers.
18. A composition according to any one of the preceding claims in which the weight ratio of dispersing agent to the low use rate primary active ingredient in the composition is 0.1 to 10:1.
19. A composition according to claim 18 in which the weight ratio of dispersing agent to the low use rate primary active ingredient in the composition is 0.4 to 6:1.
20. A composition according to any one of the preceding claims comprising, as the low use rate active, bensulfuron-methyl and further comprising propanil.
21. A composition according to claim 20 in which bensulfuron-methyl is present at a level of less than 1% by weight of the composition and propanil is present at a level of more than 50% by weight of the composition.
22. Use of a composition according any one of the preceding claims as an agrochemical.
23. A method of treating a plant by applying a herbicidally effective amount of a composition according any one of claims 1 to 21 to the plant or to the locus of the plant to be treated.
24. A method according to claim 23 in which the composition is mixed with a liquid carrier and applied to the plant or the locus of the plant.
25. A method according to any one of claims 23 or 24 in which the primary active is applied to the plant or the locus of the plant at a rate of use of less than 50 g/hectare.
26. A method according to any one of claims 23 to 25 in which the composition comprises, as a secondary active ingredient, propanil and the secondary active is applied to the plant or the locus of the plant at a rate of use of less than 7000g/hectare.
27. A process for the production of a composition according to any one of claims 1 to 21 comprising preparing a wetted mix in the form of a free-flowing powder comprising a primary active ingredient and a dispersing agent and optionally other components wherein at least one component of the composition is liquid and extruding the mix to form an extrudate and drying the extrudate to form granules.
28. A process according to claim 27 which comprises preparing a pre-mix comprising a secondary active ingredient and combining the pre-mix with the dispersing agent and the primary active ingredient to form the mix for extrusion.

55 Patentansprüche

1. In Wasser dispergierbare granulare agrochemische Zusammensetzung mit einem Gehalt an einem primären agrochemischen aktiven Bestandteil mit einem Anteil von weniger als 50 Gewichts-% der Zusammensetzung und an

einem Dispergiemittel, wobei die Zusammensetzung erhältlich ist durch ein Verfahren, das einschließt: Zubereiten einer angefeuchteten Mischung in der Form eines frei-fließenden Pulvers mit einem Gehalt an dem primären aktiven Bestandteil und dem Dispergiemittel und wahlweise an anderen Komponenten, wobei das Dispergiemittel und/oder eine andere wahlweise Komponente flüssig ist, und Extrudieren der Mischung um Granulat zu bilden.

2. Zusammensetzung nach Anspruch 1, bei der das primäre aktive Material ein aktiver Bestandteil mit kleiner Anwendungsrate ist.
3. Zusammensetzung nach Anspruch 1 oder 2, wobei das primäre agrochemische aktive Material einen Gehalt an Sulfonylharnstoff hat.
4. Zusammensetzung nach einem der vorhergehenden Ansprüche, wobei die flüssige Komponente in der angefeuchteten Vormischung einen Gehalt an Wasser hat.
5. Zusammensetzung nach einem der vorhergehenden Ansprüche, wobei das Extrudat getrocknet wird, um Granulat zu bilden.
6. Zusammensetzung nach einem der vorhergehenden Ansprüche, bei dem der aktive Bestandteil ausgewählt ist aus Bensulfuron - methyl, Chlorsulfuron, Cinosulfuron, Metsulfuron - methyl, Nicosulfuron, Pirimisulfuron - methyl, Rimsulfuron, Sulfometuron - methyl, Thifensulfuron - methyl, und Tiflursulfuron - methyl.
7. Zusammensetzung nach einem der vorhergehenden Ansprüche, bei der der primäre aktive Bestandteil mit einem Anteil von weniger als 30 Gewichts-% der Zusammensetzung vorhanden ist.
8. Zusammensetzung nach einem der vorhergehenden Ansprüche, bei der der aktive Bestandteil einen Gehalt an Bensulfuron - methyl und/oder Chlorsulfuron hat.
9. Zusammensetzung nach Anspruch 8, die einen Gehalt an Bensulfuron - methyl mit einem Anteil von weniger als 10 Gewichts-% der Zusammensetzung hat.
10. Zusammensetzung nach einem der vorhergehenden Ansprüche, die weiterhin einen sekundären aktiven Bestandteil mit hoher Anwendungsrate hat.
11. Zusammensetzung nach Anspruch 10, bei der der sekundäre aktive Bestandteil mit einem Anteil vorhanden ist, der größer ist als der Anteil des primären aktiven Bestandteils.
12. Zusammensetzung nach einem der Ansprüche 10 oder 11, bei der das sekundäre aktive Material mit einem Anteil von mindestens 30% vorhanden ist.
13. Zusammensetzung nach einem der Ansprüche 10 bis 12, bei der der sekundäre aktive Bestandteil mit hoher Anwendungsrate ausgewählt ist aus Abamectin, Atrazin, Benomylbentazon, Bifenox, Bromoxynil, Captan, Carbendazim, Chloridazon, Chlorothalonil, Chlortoluron, lambda - Cyhalothrin, Cyhexatin, Cymoxynil, alpha - Cypermethrin, Deltamethrin, Dimethomorph, Diuron, Ethofumesat, Fibronil, Flurtamon, Glyphosat, Imazamethabenz - methyl, Imazapyr, Imazethapyr, Imadacloprid, Isoproturon, Linuron, Mancozeb, Maneb, Metamitron, Methiocarb, Metribuzin, Milbectin, Oxadixyl, Oxyfluorfen, Phenmedipham, Propanil, Propyzamid, Simazin, Thifensulfuron - methyl und Thiram.
14. Zusammensetzung nach Anspruch 13, bei der der sekundäre aktive Bestandteil einen Gehalt an Propanil hat.
15. Zusammensetzung nach Anspruch 14, bei der das Propanil mit einem Anteil von mindestens 50 Gewichts-% der Zusammensetzung vorhanden ist.
16. Zusammensetzung nach einem der vorhergehenden Ansprüche, bei der das Dispergiemittel einen Gehalt an einer anionischen und/oder nichtionischen oberflächenaktiven Substanz hat.
17. Zusammensetzung nach Anspruch 16, bei der das Dispergiemittel ausgewählt ist aus Alkalimetallsalzen von Lignosulphonaten, Naphthalen - sulfonat - formaldehyd - Kondensaten, Tristyrylphenol - ethoxylat - phosphat - estern, aliphatischen Alkohol - ethoxylaten, Alkylphenol - ethoxylaten, Ethylenoxid/Propylenoxid (EO-OP) - Block

- Copolymeren, "Comb"-Pfropf - copolymeren und Polyvinylalkohol - vinylacetat - copolymeren.

- 5 18. Zusammensetzung nach einem der vorhergehenden Ansprüche, bei der das Gewichtsverhältnis des Dispergiermittels zu dem primären aktiven Bestandteil mit niedriger Anwendungsrate in der Zusammensetzung 0,1 bis 10:1 beträgt.
19. Zusammensetzung nach Anspruch 18, bei der das Gewichtsverhältnis des Dispergiermittels zu dem primären aktiven Bestandteil mit niedriger Anwendungsrate in der Zusammensetzung 0,4 bis 6:1 ist.
- 10 20. Zusammensetzung nach einem der vorhergehenden Ansprüche, mit einem Gehalt an Bensulfuron - methyl als das aktive Material mit niedriger Anwendungsrate und weiterhin mit einem Gehalt an Propanil.
21. Zusammensetzung nach Anspruch 20, bei der Bensulfuron - methyl mit einem Anteil von weniger als 1 Gewichts-% der Zusammensetzung vorhanden ist und Propanil mit einem Anteil von mehr als 50 Gewichts-% der Zusammensetzung vorhanden ist.
- 15 22. Verwendung einer Zusammensetzung nach einem der vorhergehenden Ansprüche als eine Agrochemikalie.
23. Verfahren zum Behandeln einer Pflanze durch Anwenden einer als Herbizid wirksamen Menge einer Zusammensetzung nach einem der Ansprüche 1 bis 21 an der Pflanze oder an dem Ort (locus) der Pflanze, die zu behandeln ist.
- 20 24. Verfahren nach Anspruch 23, bei dem die Zusammensetzung mit einem flüssigen Träger gemischt wird und an der Pflanze oder dem Ort der Pflanze angewendet wird.
- 25 25. Verfahren nach einem der Ansprüche 23 oder 24, bei dem das primäre aktive Material an der Pflanze oder dem Ort der Pflanze mit einer Anwendungsrate von weniger als 50 g/Hektar angewendet wird.
- 30 26. Verfahren nach einem der Ansprüche 23 bis 25, bei dem die Zusammensetzung, als einen sekundären aktiven Bestandteil, einen Gehalt an Propanil hat, und das sekundäre aktive Material an der Pflanze oder dem Ort der Pflanze mit einer Anwendungsrate von weniger als 7000 g/Hektar angewendet wird.
- 35 27. Verfahren für die Herstellung einer Zusammensetzung gemäß einem der Ansprüche 1 bis 21, das umfasst: Zubereiten einer angefeuchteten Mischung in der Form eines frei-fließenden Pulvers mit einem Gehalt an einem primären aktiven Bestandteil und einem Dispergiermittel und wahlweise anderen Komponenten, wobei mindestens eine Komponente der Zusammensetzung flüssig ist, und Extrudieren der Mischung zur Bildung eines Extrudats und Trocknen des Extrudats zur Bildung von Granulat.
- 40 28. Verfahren nach Anspruch 27, das mit einschließt: Zubereiten einer Vormischung mit einem Gehalt an einem sekundären aktiven Bestandteil und Kombinieren der Vormischung mit dem Dispergiermittel und dem primären aktiven Bestandteil, um die Mischung für die Extrusion bilden.

Revendications

- 45 1. Composition agrochimique granulaire hydrodispersible comprenant une matière active agrochimique principale à raison de moins de 50% en poids de la composition et un agent de dispersion, la composition pouvant être obtenue par un procédé consistant à préparer un mélange mouillé sous la forme d'une poudre à écoulement libre comprenant la matière active principale et l'agent de dispersion et éventuellement d'autres composants, dans laquelle au moins un élément parmi l'agent de dispersion et un autre composant éventuel est liquide, et à extruder le mélange de façon à former des granulés.
- 50 2. Composition selon la revendication 1, dans laquelle la matière active principale est une matière active à faible dose d'utilisation.
- 55 3. Composition selon la revendication 1 ou 2, dans laquelle la matière active agrochimique principale comprend une sulfonyleurée.

4. Composition selon l'une quelconque des revendications précédentes, dans laquelle le composant liquide contenu dans le mélange préliminaire comprend de l'eau.
- 5 5. Composition selon l'une quelconque des revendications précédentes, dans laquelle l'extrudat est séché pour former des granulés.
- 10 6. Composition selon l'une quelconque des revendications précédentes, dans laquelle la matière active est choisie parmi le bensulfuron-méthyle, le chlorsulfuron, le cinosulfuron, le metsulfuron-méthyle, le nicosulfuron, le pirimsulfuron-méthyle, le rimsulfuron, le sulfométuron-méthyle, le thifensulfuron-méthyle et le triflousulfuron-méthyle.
- 15 7. Composition selon l'une quelconque des revendications précédentes, dans laquelle la matière active principale est présente à raison de moins de 30% en poids de la composition.
8. Composition selon l'une quelconque des revendications précédentes dans laquelle la matière active comprend du bensulfuron-méthyle et/ou du chlorsulfuron.
9. Composition selon la revendication 8 comprenant du bensulfuron-méthyle à raison de moins de 10% en poids de la composition.
- 20 10. Composition selon l'une quelconque des revendications précédentes comprenant en outre une matière active secondaire à dose d'utilisation élevée.
- 25 11. Composition selon la revendication 10, dans laquelle la matière active secondaire est présente à un taux supérieur à celui de la matière active principale.
- 30 12. Composition selon l'une quelconque des revendications 10 ou 10, dans laquelle la matière active secondaire est présente à raison d'au moins 30%.
- 35 13. Composition selon l'une quelconque des revendications 10 à 12, dans laquelle la matière active secondaire à dose d'utilisation élevée est choisie parmi l'abamectine, l'atrazine, la bénomylbentazone, le bifénox, le bromoxynil, le captane, le carbendazime, le chloridazon, le chlorothalonil, le chlortoluron, la lambda-cyhalothrine, la cyhexatine, le cymoxynil, l'alpha-cyperméthrine, la delta-méthrine, le dimétomorphe, le diuron, l'éthofumésate, le fibronil, la flurtamone, le glyphosate, l'imazaméthabenz-méthyle, l'imazapyr, l'imazéthapyr, l'imadacloprid, l'isoproturon, le linuron, le mancozèbe, le manèbe, la métamitron, le méthiocarb, la métribuzine, la milbectine, l'oxadixyl, l'oxyfluorène, le phénmédiophane, le propanil, le propyzamide, la simazine, le thifensulfuron-méthyle et le thirame.
14. Composition selon la revendication 13, dans laquelle la matière active secondaire comprend du propanil.
- 40 15. Composition selon la revendication 14, dans laquelle le propanil est présent à raison d'au moins 50% en poids de la composition.
16. Composition selon l'une quelconque des revendications précédentes, dans laquelle l'agent de dispersion comprend un tensio-actif anionique et/ou non ionique.
- 45 17. Composition selon la revendication 16, dans laquelle l'agent de dispersion est choisi parmi les lignosulfonates de métaux alcalins, les condensats de formaldéhyde et de naphthalènesulfonate, les esters tristyrylphénol éthoxylate phosphate, les éthoxylates d'alcool aliphatique, les éthoxylates d'alkylphénol, les copolymères séquencés oxyde d'éthylène/oxyde de propylène (EO/PO), les copolymères greffés "en peigne" et les copolymères poly(alcool vinylique/acétate de vinyle).
- 50 18. Composition selon la revendication 18, dans laquelle le rapport pondéral de l'agent de dispersion à la matière active principale à faible dose d'utilisation dans la composition va de 0,1 à 10:1.
- 55 19. Composition selon la revendication 18, dans laquelle le rapport pondéral de l'agent de dispersion à la matière active principale à faible dose d'utilisation dans la composition va de 0,4 à 6:1.
20. Composition selon l'une quelconque des revendications précédentes comprenant, en tant que matière active à faible dose d'utilisation, du bensulfuron-méthyle et comprenant en outre du propanil.

21. Composition selon la revendication 20, dans laquelle le bensulfuron-méthyle est présent à raison de moins de 1% en poids de la composition et le propanil est présent à raison de plus de 50% en poids de la composition.

22. Utilisation d'une composition selon l'une quelconque des revendications précédentes en tant que produit agrochimique.

23. Procédé de traitement d'une plante consistant à appliquer une quantité efficace sur le plan herbicide d'une composition selon l'une quelconque des revendications 1 à 21, sur la plante ou sur le site de la plante à traiter.

24. Procédé selon la revendication 23, dans lequel la composition est mélangée à un véhicule liquide et appliquée sur la plante ou sur le site de la plante.

25. Procédé selon l'une quelconque des revendications 23 ou 24, dans lequel la matière active principale est appliquée sur la plante ou sur le site de la plante à une dose d'utilisation inférieure à 50 g/hectare.

26. Procédé selon l'une quelconque des revendications 23 à 25, dans lequel la composition comprend, en tant que matière active secondaire, du propanil, et la matière active secondaire est appliquée sur la plante ou sur le site de la plante à une dose d'utilisation inférieure à 7 000 g/hectare.

27. Procédé de production d'une composition selon l'une quelconque des revendications 1 à 21 consistant à préparer un mélange mouillé sous la forme d'une poudre à écoulement libre comprenant une matière active principale et un agent de dispersion et éventuellement d'autres composants, dans lequel au moins un composant de la composition est liquide, et à extruder le mélange pour former un extrudat, et à sécher l'extrudat pour former des granulés.

28. Procédé selon la revendication 27 qui consiste à préparer un mélange préliminaire comprenant une matière active secondaire, et à combiner le mélange préliminaire à l'agent de dispersion et à la matière active principale pour former le mélange à extruder.

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